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Irrigation water requirement of fruit trees in the Central, West and South Serbia on a district scale

Aleksa Lipovac¹, Dragan Nikolić¹, Dejan Djurović¹, Djordje Boškov¹, Mirjam Vujadinović-Mandić¹, Ana Vuković-Vimić¹, Marija Čosić¹

¹ *Faculty of Agriculture, University of Belgrade, Serbia*

Corresponding author: Aleksa Lipovac, alipovac@agrif.bg.ac.rs

Abstract

A common problem of all fruit producers is establishing the optimal irrigation schedule (irrigation interval and amount of water) which would provide a high-quality yield with efficient use of water, preservation of soils and the environment. In this study, Seasonal Irrigation Water Requirement (SIWR) was calculated from the difference between the crop evapotranspiration (ET_c) and effective rainfall (P_e) for the fruit crops in the 13 districts of Central (CS), West (WS), and South Serbia (SS). Analysed fruit production averaging around 9.8% of total arable land area. Depending on the crop water requirements and grass cover (GC) fruits were separated into seven groups: apples, pears, plums, walnuts and hazels without GC (I) and with GC (II); apricots, peaches, nectarines without GC (III) and with GC (IV); sweet cherries, sour cherries without GC (V) and with GC (VI) and raspberries, blackberries, blueberries (VII). Reference evapotranspiration (ET_o), P_e, ET_c, and SIWR were calculated based on FAO-56 methodology using daily meteorological data (mean, maximum and minimum temperature, extra-terrestrial radiation and rainfall) for the period 2000-2019 obtained from 13 meteorological stations. The average SIWR amounts to 349, 541, 153, 272, 123, 220, and 207 mm for all the seven groups; I, II, III, IV, V, VI, and VII, respectively. Spatially SIWR values ranged from 232.8, 366.5, 428.2 mm for WS, CS, and SS districts respectively. Depending on whether the orchard is grass-covered or not ET_o changes significantly. Crop evapotranspiration is 26% higher in the GC orchards compared to the orchards without GC. Great differences in SIWR going from Western to Eastern parts of Serbia indicate that for good irrigation practices and efficient irrigation system design, it is necessary to adopt SIWR calculated on a district scale or even farm scale. Obtained results indicate that besides SIWR, selecting the proper agronomy practices and growing systems has a significant impact on obtaining high-quality yields while saving water and preserve soils.

Key words: Irrigation Water Requirements, fruit plantations, evapotranspiration, grass-cover